

## **The impact of total quality management and innovation to the performance of hospitals**

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### **Abstract**

The main objective of the study is to examine impact of Total Quality Management approaches and innovation to performance of hospitals in private hospitals. We conducted face-to-face questionnaires with 137 of 33 private hospital managers affiliated to the ministry of health in Ankara. We used simple and multiple regression analysis to investigate relationship between variables with SPSS 21,0 analyze programme, including literature review. According to results of the tests there is positive and strong relationship between innovation and some TQM approaches with performance of hospitals. As a conclusion To improve performance of hospitals, implementation of TQM practices have positively significant effect. Also innovation in health services increase satisfaction of patients and employees and thus effect performance level favorable.

**Key Words:** Total Quality Management, Innovation, Hospital Performance, Regression

### **Introduction**

The purpose of the study is after the establish of the Association of Performance Management and Improvement Quality on-site of Ministry of Health in Turkey, put forth the contribution of TQM practices and innovation approach in hospitals to performance of hospitals between 2007 and 2016. In order to do this, the questionnaire study which will be performed with hospital managers, is evaluated whether the change in the process makes a significant contribution to performance.

TQM demands that change be based on the requirements of the client not the values of providers. It requires the significant participation of all personnel department and a speed and thoughtful reaction from top management to suggestions made by participating personnel. TQM, first occurred in the United States and successfully implemented in Japan is clearly pick up serious attention by U.S. health service organizations as they try to upgrade quality with fewer resources (McLaughlin & Kaluzny, 1990).

TQM is a systematic approach to prepare and perform continuous improvement in performance. TQM emphasizes persistent examination and development of work processes by teams of organizational colleagues worked out in essential statistical techniques and problem solving tools and authorized to make decisions based on their analysis of the data. TQM practices is ordering on individuals and organizations. It requires continuous leadership, comprehensive training and support, robust measurement and data systems, realigned incentives and human resources practices, and cultural openness to change (Weiner, Alexander, Baker, Shortell, & Becker, 2006).

TQM is a procedure increasingly used by hospitals to develop the quality and results of care. It is determined as the systematic participation of health care teams in identifying the fundamental causes of unnecessary variation in processes and results of care and taking restorative and preventative action with the goal of persistent quality improvement in patient care delivery (Shortell, et al., 2000). TQM would provide experimental controls and random placement of subjects and problems, permitting the TQM approach to problem solving to succeed or not with controls (Lammers, Cretin, Gilman, & Calingo, 1996).

TQM is a notional approach different from quality guarantee and quality investigation and runs counter to many underlying suppositions of bureaucracies. TQM demands that change be based on the requirements of the customer, not the importance of the providers. It requires the meaningful participation of all personnel and a rapid and thoughtful response from top management to suggestions made by participating personnel (McLaughlin & Kaluzny, 1990).

TQM aimed at meeting customer satisfaction which is consolidated system of persistent quality improvement. The aim of the TQM is the elimination of the faults by remove the occasions of the faults. TQM is proactive in nature, its purpose is to build quality goods and services into the design of the process and then continuously to improve them (Short, 1995). Quality improvement may demonstrate encouraging strategy for decrease errors and increase safety in hospitals (Weiner, Alexander, Baker, Shortell, & Becker, 2006).

Performance is an output that employee gained as a result of to realize organizational aims that wanted to be reach. In literature organizations have seven levels of performance that these are efficiency, productivity, quality, working environment, innovation and profitability. TQM also has the mission of collecting and analyzing the performance outputs and data that obtained in order to improve service quality in health institutions. In this context accurate measurement of performance is one of the objectives of TQM.

Several studies have examined relationship of TQM and hospital performance. Alexander, Weiner and Griffith examine the association between the scope and intensity level of quality improvement implementation in hospitals and organizational performance. Sample of 1784 hospitals was used to assess relationship as a result of study hospitals that implement QI effectively can reasonably expect to improve their financial and cost performance (Alexander, Weiner, & Griffith, 2006).

Kunst and Lemmink showed in their study that different explanatory variables are linked to progress in total quality management and business performance. Result of the study, there is a positive link between progress in TQM and perceived service quality by customers (Kunst & Lemmink, 2000).

Alolayyan et all study and analyse the implementation of TQM and operational flexibility dimensions towards improving hospital performance and reducing costs and medical errors. They propose a mathematical model employing artificial neural networks. Results of the study give avery high degree of accuracy in relationship between TQM variables and operational flexibility dimensions to hospital performance (Alolayyan, Ali, Idris, & Ibrehem, 2011).

Carter et all separate the concept of TQM into two dimensions that quality practices and quality context. They employ a structural equation modeling to show that quality practices and quality context are distinct model components operating at the same time through the endogenous construct of TQM to positively impact hospital performance. In order to improve hospital performance, scope of the organizations quality activities need to be very broad and surrounding. Additionally authors assess the potential moderating effects

of environmental uncertainty and hospital size on the quality management-performance relationship (Carter, Lonial, & Raju, 2010).

#### MATERIALS and METHODS

We obtain data from private hospitals managers in Ankara province. we carried out to validate the questionnaire and to gain more in depth perceptions in innovation and quality practices of hospitals. Scales which will use for study prepared according to literature. Innovation scale, TQM scale and performance scale questions asked to 137 managers. Innovation scale transcribed from (Wang & Ahmed, 2004) and Day(1977) scales. TQM scale has seven approaches that management leadership, employee participation and process approach transcribe from (Cua, McKone, & Schroeder, 2001), decision making and continuous improvement approach from Kaynak(2003), relation with suppliers and patient focus approach from (Rahman & Bullock, 2005), (Chong & Rundus, 2004), (Fuentes-Fuentes, Albacete-Saez, & Montes, 2004). Performance scale transcribe from study of (Fuentes, Saez and Montes, 2004).

There are two research questions; First one is innovations in health systems affects the performance of health institutions. Second is TQM practices in hospitals affect the performance of hospitals.

We use in this study simple regression model and multiple regression model. Simple regression model developed fort he relation between innovation approach and hospital performance. Multiple regression model developed for correlation between TQM approaches and hospital performance. Dependent variable in both two analysis is hospital performance scale(HPS). Independent variable is innovation scale(IS) for simple regression model and TQM approaches which management leadership(ML), decision making(DM), process(P), continuous improvement(CI), employee participation(EP), suppliers relation(SR) and patient focus(PF).

#### Results

##### Reliability analysis

Variables	Number of Items	Cronbach's Alpha
IS	11	0.809
HPS	12	0.854
ML	6	0.781
DM	8	0.726
P	7	0.786
CI	6	0.734
EP	5	0.726

The reliability analysis was conducted by calculating the Cronbach's Alpha for each scale to check the consistency of TQM approaches and performance level of hospitals. the results in the Table 1 demonstrate that the values of Cronbach's Alpha are between 0,714 and 0,854, so these values indicate igh reliability of scales.

**Table 1: Cronbach's Alpha values for each variables**

<b>SR</b>	5	0.779
<b>PF</b>	7	0.714

Statistical analysis

### Simple Regression Model

Regression analysis is a method used to examine the relationship between a single dependent variable and single independent variable. This analysis was tested to research whether there is any significant relation between innovation and hospital performance. To check the assumptions regarding normality and linearity, p-p plot of residuals were carried on Figure 1. Durbin-Watson value obtained 1,790 which is between 1,50 and 2,50 demonstrate that there is no autocorrelation issue in the data.

**Figure 1: Normal p-p plot of regression standardized residual**

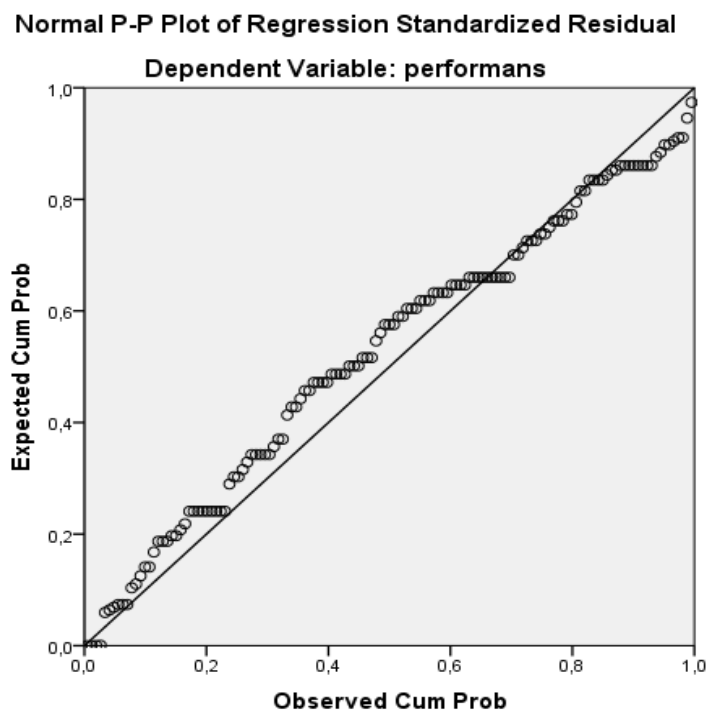


Table 2 showed the results of simple regression model. R square value of analysis is 0,529 that means innovation approach in hospitals explain changes in hospital performance in proportion as %52. F statistic significance value is 0.000. There fore our test is entirely significant. In the table parameters estimates are given. Coefficient of innovation scale variable is 0,825 and t-test of this model is significant because significance value is less than 0,05. Coefficient of innovation scale means that increase by one unit in innovation scale will increase 0,825 unit to hospital performance.

**Table 2: Simple Regression Model Results**

Model	R	R Square	Adjusted R Square		Std. Error of the Estimate	Durbin Watson
1	,727 <sup>a</sup>	0,529	0,525		0,2239	1,790
ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.

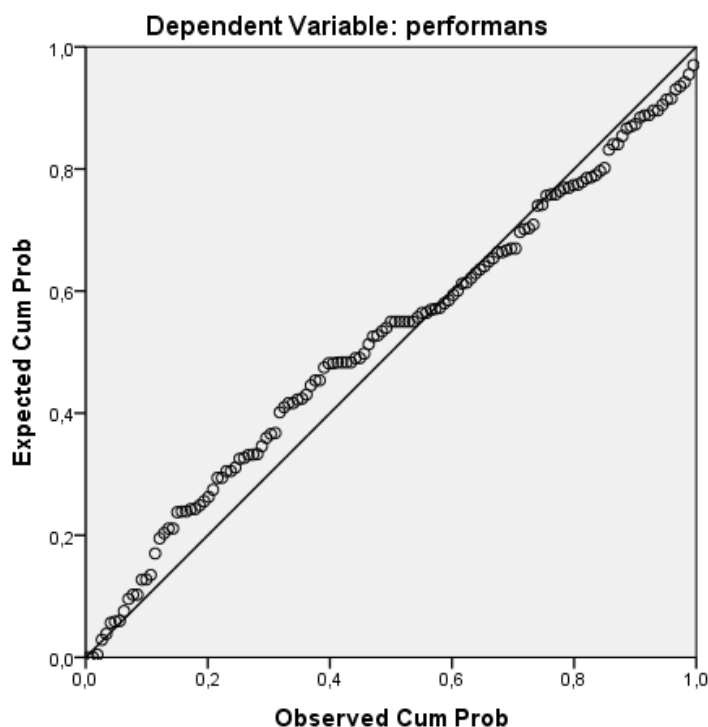
<b>1</b>	Regression	7,601	1	7,601	151,608	0
	Residual	6,768	135	0,05		
	Total	14,369	136			
<b>Coefficients</b>						
<b>Model</b>		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
<b>1</b>	(Constant)	0,781	0,315		2,477	0,014
	innovation scale	0,825	0,067	0,727	12,313	0,000

### Multiple Regression Model

Multiple regression analysis is a method used to examine the relationship between a single dependent variable with multiple independent variables. This analysis is tested the research whether there is any significant relation between TQM approaches and hospital performance. model results demonstrated in Table 3. Normal p-p plot of residuals were conducted to explore the assumptions regarding normality and linearity. Figure 2 demonstrate that plot. The Durbin Watson value is 2,016 which is between 1,50 and 2,50 that there is no autocorrelation in the data. Also Table 3 shows that each variables tolerance value are hihger than 0,10 and variance inflation factor(VIF) is less than 10. These findings point out that the model had no serious multicollinearity problem. The coefficient of determination  $R^2$  value shows the percentage of the dependent variable explained by the independent variables included in the model.

**Figure 2: Normal p-p plot of regression standardized residual**

**Normal P-P Plot of Regression Standardized Residual**



In multiple regression models  $R^2$  increases automatically as the number of variables increase. It is much more accurate that using the adjusted  $R^2$  value instead of  $R^2$ . Adjusted  $R^2$  is 0,702 which express %70 of hospital performance was explained by TQM approaches. The proposed model was significant at the 1% level(F-statistics significant value is 0,000). This means that there is a strong statement that all model was statistically significant and there is positive relationship between TQM approaches and hospital performance. The standardized beta coefficients and t-values demonstrated in Table 3 point out the positive association between three TQM approaches which are CI, PF and EP with the hospital performance. We use stepwise selection method in regression model. In this method each variable added to model in order and than model is evaluated. If the added variable contributes to the model the variable remains in the model. However, the other variables in the model retested to assess whether they contribute to the model. If there is no significant contribution, it is removed from model. Thus, the model is explained with the help of the minimum number of variables.

Model Summary							
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson		
1	.754 <sup>a</sup>	0.569	0.566	0.21415	2,016		
2	.810 <sup>b</sup>	0.657	0.652	0.19187			
3	.838 <sup>c</sup>	0.702	0.695	0.17953			
ANOVA <sup>a</sup>							
Model		Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	8.177	1	8.177	178.31	0.000	
	Residual	6.191	135	0.046			
	Total	14.369	136				
2	Regression	9.436	2	4.718	128.159	0.000	
	Residual	4.933	134	0.037			
	Total	14.369	136				
3	Regression	10.082	3	3.361	104.262	0.000	
	Residual	4.287	133	0.032			
	Total	14.369	136				
Coefficients <sup>a</sup>							
Model		Unstandardized B	Standardized Beta	t	Sig.	Collinearity Tolerance	VIF
1	(Constant)	1.331	0.25	5.336	0.000	1,000	1,000
	CI	0.714	0.754	13.353	0.000		
2	(Constant)	0.523	0.263	1.991	0.048	0.540	1.853
	CI	0.456	0.481	6.983	0.000		
	PF	0.431	0.403	5.846	0.000		
3	(Constant)	0.317	0.25	1.269	0.207	0.455	2.196
	CI	0.338	0.357	5.085	0.000		
	PF	0.328	0.306	4.505	0.000		
	EP	0.266	0.293	4.477	0.000		

**Table 3 Multiple Regression Model Results**

Correlation analysis results of performance and innovation variables are shown in table 4. The pearson correlation coefficient was found to be 0,727. The fact that this coefficient is close to 1 indicates that the strong relationship. In addition the sign of this coefficient “+” indicates that positive relationship. It can be said that there is a strong and positive relationship between hospital performance and innovation.

**Table 4: Correlation Results Between Hospital Performance and Innovation**

		Performance	Innovation
Performance	Pearson	1	,727**
	Sig. (2-tailed)		,000
	N	137	137
Innovation	Pearson	,727**	1
	Sig. (2-tailed)	,000	
	N	137	137

The results of the correlation analysis between the CI, PF, EP and hospital performance variables, which we found relationship according to multiple regression test, are shown in table 5. Pearson correlation coefficients were respectively 0,754-0,712-0,729. In this case CI, PF and EP from the TQM approaches are positively and strongly associated with performance of hospital.

		Performance	Continuous Improvement	Employee Participation	Patient Focus
<b>Performance</b>	Pearson Correlation	1	,754**	,713**	,729**
	Sig. (2-tailed)		,000	,000	,000
	N	137	137	137	137

**Table 5: Correlation Results Between Hospital Performance and CI, EP and PF**

### Discussion

According to the results, some but not all TQM approaches have significant effect on hospital performance. This study revealed three TQM approaches which are continuous improvement(CI), patient focus(PF) and employee participation(EP). PF leads to a better understanding of patients requirements and expectations, afterwards this will help to increase performance. Patient feedbacks and use these feedbacks in processes improve satisfaction and also performance of hospitals. EP leads to adapting quality management practices to organization culture and employees in organization. Providing more constructive and objective feedback to health workers and more effective planning and guidance of their individual development and training increases the employees organizational loyalty and job satisfaction, thus directly affecting performance positively. Another significant approach is CI. TQM supports the systematic follow-up of the achievements, personal qualities and developmemnt potentials of the health sector employees with scientific methods. In other words, it is importatnt to make a judgement about the performance of employees. In addition, TQM focuses on basic responsibilities related to working life, organizational behaviours and aims to optimize the performance of the organization and individuals.

### CONCLUSION

In terms of organization, performance is an important trigger for sustainability and quality. This research in line with these definitions it aims to reveal the effect of total quality management and innovation on the performance of hospitals. The results of the study demonstrate the importance of TQM practices and innovation in hospitals by revealing its positive effect on the performance of private hospitals in Turkey. In response to the research the findings gave a statistical evidence for the positive and significant relationship between TQM approaches, innovation and hospital performance. The results demonstrate that three TQM approaches are significantly and positively related to hospital performance. Continuous improvement approach, patient focus approach and employee participation approach has the strong association with the performance level of hospitals. In addition to this innovation practices also has positive relation with the performance. In practice, the effective implementation of these TQM approaches can help health organizations to improve their performance level.

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